PROGRESS REPORTS

FROM

EXPERIMENT STATIONS

SEASON 1953-54

ANGLO-EGYPTIAN SUDAN

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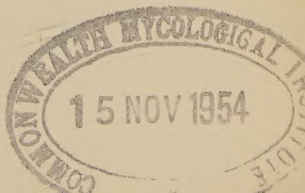

PROGRESS REPORTS FROM EXPERIMENT STATIONS.

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ANGLO-EGYPTIAN SUDAN

COTTON BREEDING STATIONS
PROGRESS REPORT FOR THE SEASON 1953-54

	Planting Dates.	*Picking Dates.*
Gezira	Mid August to mid September.	January to March.
Gash	Late August to late September.	Mid January to April.
Tokar	Early September to mid October.	January to May.
Kordofan	Mid June to mid August.	Mid October to February.
Zeidab	First half May.	September to December.
Equatoria	Mid May to August.	October to mid February.

Introductory Note

BY

R. L. KNIGHT AND M. F. ROSE.

Staff.

Dr. R. L. Knight, O.B.E., Chief Cotton Breeder and Geneticist to the Sudan Government, left the Sudan on final leave in April 1954: he had spent 25 years in the country, 22½ as an Officer of the Empire Cotton Growing Corporation. Every good wish is extended to him in his new appointment at East Malling, Kent.

Mr. J. H. Saunders arrived in the Sudan in August 1953, on transfer from Nigeria. He has filled the post at Shambat left vacant by the death of Mr. J. Sadd. Mr. R. L. Cuany resigned in the early part of the year because of ill health.

Mr. Low, who has been working on Egyptian cottons at Wad Medani since August 1952, was transferred to Kordofan for work on the American crop. He took up his new appointment as Cotton Breeder, Kadugli, in mid May 1954.

Visitors.

Dr. G. M. Wickens of the Cotton Research Station, Namulonge, arrived in the Sudan in October 1953. He visited Shambat, Wad Medani and the Southern Gezira. Various aspects of the blackarm problem were discussed.

Mr. J. C. May, Director of the Empire Cotton Growing Corporation, toured the Western and Eastern Jebels of Kordofan in November 1953. Semeiha, part of the Abu Habl scheme, was also visited.

Mr. C. Underwood of the Shirley Institute spent 11 days in the Central Gezira. He left Wad Medani for Uganda on 21st January 1954.

Mr. J. Littlewood, Chairman of the Empire Cotton Growing Corporation, and Mr. J. C. May, visited the Sudan from 23rd January to 1st February 1954. High level discussions on future policy and the prospects of the Sudan crop took place both in Khartoum and Barakat.

Dr. Thomas Kerr, Cotton Technologist in Charge, Cotton Breeding and Fibre Quality Investigations, U.S.D.A., arrived at Shambat on 11th April 1954. A few days were spent at Wad Medani before his departure on 15th April.

Tours.

Dr. R. L. Knight and Mr. M. F. Rose arrived at Juba on 18th December. They toured the cotton growing areas on the East and West bank of the Nile. Meridi, Yambio and Nzara were visited. At the Yambio Research Station, cotton problems were discussed at a meeting convened by the Senior Research Officer.

Commercial Cotton.

Areas and yields are tabulated below: —

(i) *Egyptian cotton*

	Area (feddans)	*Yields (kantars)*	
Gezira	234,872	1,102,090	
White Nile	63,988	277,880	
Abdel Magid	9,980	37,826	
Gash	55,490	60,890	
Tokar	70,000	75,202	(estimated)
	434,330	1,553,888	

(ii) *American cotton*

	Area (feddans)	*Yields (kantars)*	
Irrigated	6,299	22,730	
Flood (Abu Habl)	3,164	6,690	
Raingrown	183,600	234,549	*
	193,063	263,969	

* Including BAR 7/3 and S47.

1 feddan = 1·038 acres. 1 kantar = 315 rotls = 312 lb.

THE GEZIRA STATION.

BY

M. F. ROSE, L. C. HUGHES AND A. LOW.

Climate and Crop.

Three features distinguished the present season from that of 1952-53. (i) The peculiar distribution of the rainfall from 1st July-15th August§. (ii) The absence of weed growth in the young cotton crop. (iii) With the exception of American bollworm, the absence of pests and diseases generally. The exceptionally heavy rainfall in early August (121·5 mms. from 4th-7th inclusive) when much of the land was under water for a considerable period probably contributed to the effect of (ii) and (iii).

In the early stages, germination and growth were good and there was no malformation of plant structure (loss of central sympodia) as in the previous season. Some stunting and dwarfing, however, did

§The 'July-August effect' (228·8 mms.).

occur and this was most marked in all American types. (See Observation.)

Flea beetle (*Podagrica puncticollis*) attack was negligible and blackarm and leafcurl counts showed figures of less than 1% infection on all susceptible material. In October American bollworm (*Heliothis armigera*) was active in all American plots and these became focal points for a spread to the Egyptian types. In the breeding plots there was a marked build-up of whitefly by 9th September and a repetition of the previous season's devastation was anticipated. This pest, however, disappeared as the season advanced. How far its control was due to a lower overall humidity is a matter for conjecture.

A cold spell through November to just before Christmas curtailed flowering and this was followed in mid January by a similar cold period accompanied by strong winds. By the end of January the cotton appeared to have closed down. A hot sticky period in mid February gave a slight top flush of flowers but it is doubtful if this contributed anything to final yields. At the Gezira Research Farm these were above average but in view of the season could be judged as disappointing. Domains Sakel (50 acres) averaged 1614 lb. and X1730A (89 acres) 1931 lb. of seed cotton per acre. Grade was poor, the earliest picks returning the low figure of X3.

Relevant meteorological data are given in Table 1, the 1952-53 figures being shown in brackets.

TABLE 1.

METEOROLOGICAL READINGS.

G.R.F. 1953-54.

Date		*Mean Max.* °F.	*Mean Min.* °F.	*Total Rainfall mms.*	*Average Relative Humidity 8 a.m.*
April	1953	103 (105)	69 (69)	3·0 (—)	29 (16)
May	,,	106 (106)	77 (75)	45·4 (19·0)	45 (32)
June	,,	102 (103)	75 (77)	40·7 (39·8)	55 (47)
July	,,	92 (99)	72 (74)	84·9 (75·7)	74 (62)
August	,,	89 (89)	71 (71)	158·4 (173·3)	80 (82)
September	,,	94 (94)	70 (70)	28·9 (65·0)	72 (74)
October	,,	100 (100)	69 (69)	15·1 (9·3)	52 (52)
November	,,	97 (98)	63 (63)	— (1·0)	33 (35)
December	,,	90 (94)	52 (59)	— (—)	33 (37)
January	1954	95 (96)	55 (60)	— (—)	30 (36)
February	,,	101 (98)	63 (62)	— (—)	26 (31)
March	,,	103 (102)	64 (64)	— (—)	19 (24)
			Total =	376·4 (383·1)	

BREEDING.

Egyptian (L Types).

The three groups emerging from the quality filter of the 'breeding plot stage' of the past season and comprising 31, 42 and 37 lots were

planted on 12th-15th August. This marked the 'testing plot stage' (yield) of the new selection procedure adopted in the Sudan (vide Publications). Germination and early stands were good but sporadic white ant attack in Group II necessitated yield adjustment.

Yield comparisons on the whole were disappointing. The commercial variety X1730A outyielded (lint) both parental bulks BAR 4/16 (twice significantly) and BAR 5/6 (once significantly) in the three trials. There was no significant difference between the mean values of BAR 4/16 and BAR 5/6 although the yield of the latter was consistently higher. Three sub-strains only, two from BAR 4/16 and one from BAR 5/6, outyielded X1730A.

Twenty-six sub-strains from BAR 4/16 and eight from BAR 5/6, not significantly worse than X1730A in yield, were bulked and these two special bulks will constitute the first 'panmixis' stage to be grown at Shambat. Relevant data from the combined trials are given in Table 2.

TABLE 2.

TESTING PLOT STAGE G.R.F., 1953-54.

Type.	*Genes*	*Seed Cotton lb./acre*	*G.O.T.*	*Lint lb./acre*	*Boll Wt.*	*Lint Index*	*Seed Wt.*	*Seed No. per loc.*	*Ovule No. per loc.*	*Mote %*	*Length mms. mean max.*
X1730A	$b_1 b_1$	1356	35·5	481	2·4	5·3	9·5	5·5	6·0	7·9	47·3
Parental BAR 5/6	$B_1B_1R_1R_1$	1232	33·7	415	2·2	4·9	9·4	5·2	5·9	10·5	47·3
Special Bulk BAR 5/6 (8 components)	,,	1305	33·2	432	2·2	4·8	9·6	5·2	5·9	11·6	47·4
Parental BAR 4/16	B_1B_1	1186	33·7	400	2·2	4·7	9·1	5·4	6·0	11·1	48·7
Special Bulk BAR 4/16 (26 components)	,,	1251	33·8	425	2·2	4·7	9·1	5·4	6·0	11·2	47·4

It should be noted that the three trials were carried out in the complete absence of blackarm, in a season which favoured X1730A throughout the whole Gezira.

Within BAR 4/16 and BAR 5/6 variability was low. This fact is the more remarkable in that no active selection has been made within either of the parental bulks since their synthesis by the *bulk* backcrossing technique.

Special Problems.

Work on the transference of lint retention from *G. contextum* to BLR 14/25 and the building-up of salt tolerance in BLR 14/25 was continued. In the latter case, the absence of effective cross-pollination at the Gezira Research Farm (see 1952-53 Report, Vicinism) will necessitate either artificial cross-pollination on the spot or the growing of the successive filtered 'waves' at Shambat.

Testing.

Variety Trials.

As in past seasons, the standard variety trials were planted at Turabi (North), the Gezira Research Farm (Centre) and Hag Abdulla (South) between 13th and 17th August. The layout was identical: randomized blocks of 9 varieties × 20 replications of plot size 0·01867 acres with spacing 80 cms. × 35 cms.

Good germination and initial stands were obtained at all three sites.

In the North, leafcurl attack was general and in places very severe. In the trial, Sakel and Sakel derivatives were badly affected, only BLJR 14/29 showing any measure of resistance. Symptoms appeared early in the crop and counts made on 19th February 1954 showed the following infection percentages: Domains Sakel 75·4%, BLR 14/25 75·4%, BLR 14/25.1 80·6%, BLR 14/25.2 74·2%, BLJR 14/29 43·2%. The American types, Wilds SUS 16/1 (glabrous) and Punjab 268F (strongly hairy) although showing no visible symptoms of the disease were dripping with asal (honeydew) by mid October, a measure of the severity of the whitefly attack. Only X1730A and derivatives showed normal growth, although their final yields must have been considerably reduced by direct whitefly action.

In consequence the L group outyielded the S group by 115 lb. of lint per acre, a highly significant difference. In the complete absence of blackarm, Domains Sakel showed its superiority to all BLR and BLJR derivatives for the second successive season. Of the American types, Punjab 268F headed the yield list with 594 lb. of lint per acre, a significant increase over Wilds of 72 lb.

In the Centre at the Gezira Research Farm the trial was remarkably free from all pests and diseases. There was little loss of bottom and central sympodia in Sakel types as in the previous season but dwarfing and stunting of American types was marked. Egyptian types displayed similar symptoms but to a lesser degree. This general patchiness was sporadic, with no definite trends.

As in the North, the L group again showed its superiority over the S group with a significant yield difference of 59 lb. of lint per acre. BLR derivatives showed the same general trend in relation to Domains Sakel although yield differences in favour of the latter were not so marked. Punjab 268F again responded well, giving 588 lb. of lint per acre. Wilds SUS 16/1 was disappointing: marked dwarfing of the plants was responsible for its low yield of 470 lb. lint.

In the South at Hag Abdulla the trial suffered a serious setback in mid October from American bollworm. Fortunately the whitefly build-up did not reach a peak figure and the trial came through to give fair yields.

TABLE 3.

GEZIRA VARIETY TRIALS, 1953-54.

YIELDS OF SEED COTTON AND LINT IN POUNDS PER ACRE.

Variety	*BAR Genes*	*Turabi (North)*			*G.R.F. (Centre)*			*Hag Abdulla (South)*			*Overall Mean*		
		Seed Cotton	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O T.*	*Seed Cotton*	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O.T*
S. GROUP													
Domains Sakel		1362	434	31·9	1707	551	32·3	1605	508	31·7	1558	498	32·0
BLR 14/25 Gash	B_2 B_3	1263	393	31·1	1678	534	31·8	1554	477	30·7	1498	468	31·2
BLR 14/25.1 Abu Guta	B_2 B_3	1193	377	31·6	1640	523	31·9	1549	462	29·8	1461	454	31·1
BLR 14/25.2	B_2 B_3	1231	388	31·5	1673	529	31·6	1478	451	30·5	1461	456	31·2
BLJR 14/29 Abu Guta	B_2 B_3	1212	393	32·4	1491	490	32·9	1374	442	32·2	1359	442	32·5
L. GROUP													
X1730A Gash		1424	525	36·9	1576	575	36·5	1600	557	34·8	1533	552	36·1
BAR XL1 Gash	B_2	1371	498	36·3	1647	593	36·0	1612	543	33·7	1543	545	35·3
AMERICAN													
Wilds SUS 16/1		1567	522	33·3	1423	470	33·0	—	—	—	1495	496	33·1
Punjab 268F	B_2 +	1708	594	34·8	1670	588	35·2	1592	560	35·2	1656	581	35·1
BAR 7/8.1	B_2 B_3	—	—	—	—	—	—	1134	413	36·4	1134	413	36·4
Standard Error (Mean)			11·1			18.5			18·4				
Difference P = 0·05			30·9			52			51				

TABLE 4.

SUMMARY OF PERFORMANCE OF CURRENT STRAINS IN GEZIRA VARIETY TRIALS UP TO AND INCLUDING SEASON 1953-54.

Variety	Basic Type	Seed Cotton (lb./acre) No. of Trials	Mean Variety	Mean X1730A	Mean Dom. Sakel	Variety as % of X1730A	Variety as % of Dom. Sakel	Lint (lb./acre) No. of Trials	Mean Variety	Mean X1730A	Mean Dom. Sakel	Variety as % of X1730A	Variety as % of Dom. Sakel	Location
Domains Sakel	S	15	1330	1372	1330	97	100	15	428	483	428	89	100	Northern Gezira
BLR 14/25	S	4	1560	1546	1603	101	97	4	507	572	534	89	95	Northern Gezira
BLR 14/25.1	S	2	1425	1510	1565	94	91	2	471	567	523	83	90	Northern Gezira
BLR 14/25.2	S	1	1231	1424	1362	86	90	1	388	525	434	74	89	Northern Gezira
BLJR 14/29	S	1	1212	1424	1362	85	89	1	393	525	434	75	91	Northern Gezira
X1730A	L	15	1372	1372	1330	100	103	15	483	483	428	100	113	Northern Gezira
BAR X1730L—1	L	11	1348	1431	1425	94	95	11	483	517	466	93	104	Northern Gezira
Wilds SUS 16/1	L	2	1605	1511	1566	106	102	2	538	568	524	95	103	Northern Gezira
Punjab 268F	L	1	1708	1424	1362	120	125	1	594	525	434	113	137	Northern Gezira
BAR 7/8.1	L	—	—	—	—	—	—	—	—	—	—	—	—	Northern Gezira
Domains Sakel	S	28	1581	1861	1581	85	100	28	501	657	501	76	100	Central Gezira
BLR 14/25	S	4	1409	1385	1193	102	118	4	451	509	395	89	114	Central Gezira
BLR 14/25.1	S	2	1554	1619	1522	96	102	2	497	595	499	83	100	Central Gezira
BLR 14/25.2	S	1	1673	1576	1707	106	98	1	529	575	551	92	96	Central Gezira
BLJR 14/29	S	1	1491	1576	1707	95	87	1	490	575	551	85	89	Central Gezira
X1730A	L	28	1861	1861	1581	100	118	28	657	657	501	100	131	Central Gezira
BAR X1730L—1	L	12	1679	1566	1294	107	130	12	597	565	419	106	142	Central Gezira
Wilds SUS 16/1	L	2	1752	1620	1522	108	115	2	584	595	499	98	117	Central Gezira
Punjab 268F	L	1	1670	1576	1707	106	98	1	588	575	551	102	107	Central Gezira
BAR 7/8.1	L	—	—	—	—	—	—	—	—	—	—	—	—	Central Gezira
Domains Sakel	S	11	1302	1454	1302	89	100	11	417	515	417	81	100	Southern Gezira
BLR 14/25	S	4	964	967	799	100	121	4	295	339	254	87	116	Southern Gezira
BLR 14/25.1	S	2	1118	1205	1113	93	100	2	339	422	354	80	96	Southern Gezira
BLR 14/25.2	S	1	1478	1600	1605	92	92	1	451	557	508	81	89	Southern Gezira
BLJR 14/29	S	1	1374	1600	1605	86	86	1	442	557	508	79	87	Southern Gezira
X1730A	L	11	1454	1454	1302	100	112	11	515	515	418	100	123	Southern Gezira
BAR X1730L—1	L	11	1359	1234	1021	110	133	11	474	434	331	109	143	Southern Gezira
Wilds SUS 16/1	L	—	—	—	—	—	—	—	—	—	—	—	—	Southern Gezira
Punjab 268F	L	1	1592	1600	1605	99	99	1	560	557	508	100	110	Southern Gezira
BAR 7/8.1	L	1	1134	1600	1605	71	71	1	413	557	508	74	81	Southern Gezira

TABLE 5.

SUMMARY OF SPINNING TEST REPORTS ON CURRENT STRAINS IN GEZIRA VARIETAL TESTS, 1942-43 TO 1952-53.

Variety	Type	Effective Length 32's No. of Trials	Mean Variety	Mean Dom. Sakel	Standard Hair Weight No. of Trials	Mean Variety	Mean Dom. Sakel	Corrected Lea-Strength Products No. of Trials	Means of 80's Counts Variety	Means of 80's Counts Dom. Sakel	No. of Trials	Means of 100's Counts Variety	Means of 100's Counts Dom. Sakel
BLR 14/25	S	6	47·0	45·5	6	150	151	6	2541	2543	6	2261	2229
BLR 14/25.1	S	3	46·0	45·3	3	153	155	3	2454	2483	3	2242	2251
		No. of Trials	Variety	X1730A	No. of Trials	Variety	X1730A	No. of Trials	Variety	X1730A	No. of Trials	Variety	X1730A
BAR X1730L—1	L	20	46·6	46·1	20	162	162	28	2074	2071	19	1861	1865
BAR X1730L—3	L	6	45·3	45·8	6	167	163	6	2249	2250	6	1903	1930

The L group outyielded the S group by 82 lb. of lint per acre, a significant difference. Domains Sakel again surpassed in yield all derivatives from it, with BLJR 14/29 disappointingly low. Punjab 268F gave the highest yield (560 lb. lint) of all varieties tested, with BAR 7/8.1, the lowest (413 lb.).

As a fair generalisation, the season eminently suited the L types throughout the Gezira: the overall response (581 lb. lint per acre) of Punjab 268F is also worthy of note.

Relevant data for the 1953-54 trials are given in Table 3, with summarized performance for yield and spinning test figures in Tables 4 and 5.

Miscellaneous.

(a) At the Gezira Research Farm, a randomized block experiment (11 replications) was laid down on 15th August to test X1730A (commercial bulk) against BAR XL.3. Unfortunately sufficient seed of the latter was not available for the standard trials. In the past two seasons, BAR XL.3 has shown a marked response to the wetter conditions of the Centre and South, outyielding (lint) X1730A by 9% and 37% respectively. Figures in Table 6 indicate a complete reversal of performance, X1730A outyielding BAR XL.3 by 8%.

TABLE 6.
COMPARISON OF X1730A AND BAR XL.3.

Variety	*Lint (lb./acre)*	*G.O.T.*
X1730A	558	36·5
BAR XL.3	517	36·0
S.E. (mean)	9	
Sign. diff. (P=·01)	41	

(b) With the exclusion of BAR 12/9, the Tokar trial of the previous season was repeated. XAT.1, XAT and XAG were replicated 10 times in a randomized block experiment planted on 28th September. The origin of XAT.1 and XAT (possible shade-tolerant genotypes within the Gash-Gezira crop, XAG) and their acclimatization at Tokar was discussed in the 1952-53 Report.

The results, as shown in Table 7, are disappointing. They do not confirm the general postulate and are not in accord with the findings of the previous season.

TABLE 7.
TOKAR TRIAL.

Variety	*Lint (lb./acre)*	*G.O.T.*
XAT.1	180	33·1
XAT	134	29·9
XAG	205·5	33·2
S.E. (mean)	13·3	
Sign. diff. (P=·05)	39·5	

Observation.

At the request of the Gezira Board, much time was devoted to a survey of American types grown under irrigation. Local rain-fed types were included together with introductions from overseas. Such a step did not admit of any drastic change in general policy but was undertaken in the light of (i) the very rapid fall in the price of Egyptian types in relation to that of American and a possible shift in demand to the shorter staple cottons, (ii) the increase in area envisaged for the main Gezira crop, (iii) the question of water economy in terms of water stoppage in December.

Nine varieties were grown, five Sudan rain-fed types and four introductions from abroad. The former were represented by BAR 11/3 (Deltapine carrying B_2), BAR 11/5 (XA 129 ex Pump Scheme Strain carrying B_2), BAR 11/7 (XA 129 carrying B_2 and B_3), Wilds SUS 16/1 (an American irrigated originating from Zeidab) and BAR 7/8.1 (BAR SP84 carrying B_2 and B_3): the latter by Punjab 268F ex Pakistan 1952 and 1953, a very early prolific type, blackarm resistant, jassid resistant and tolerant of salty conditions under irrigation with staple length flat $\frac{13}{16}$″, Hopi Acala ex U.S. Department of Agriculture, 1953, an early prolific type with high intrinsic fibre strength, possibly carrying B_2 and B_3, with staple length 1″, and Tanguis (types CNPC 46 and 47) the distinctive monopoly cotton of Peru and highly favoured by various sections of the trade.*

Following their standard practice, the Gezira Board planted four of the most likely types, Punjab 268F, Hopi Acala, Wilds SUS 16/1 and BAR 7/8.1 in strips up to 10 acres at Kab El Gidad (North), Nidiana (Centre) and Hosh (South). The Cotton Breeding Section undertook to make a detailed study of all nine types at the Gezira Research Farm (Centre) with the two Tanguis strains also under observation at the Prison Farm, Abdel Magid (North). General allocations between the Gezira Board and the C.B.S. were governed by the quantity of seed available.

With the possible exception of Punjab 268F, the season and conditions generally did not favour these American types although the response was more positive in the North than in the Centre and South. Wilds SUS 16/1, which can be treated as an acclimatized American control, showed the same general trend from North to South and, in terms of previous seasons' figures, yield was down although its high quality was maintained.

At all 3 Gezira Board sites, BAR 7/8.1 appeared unhappy: early leaf yellowing followed by rapid senescence and leaf shed marked the progress of this strain. Contrary to expectations, however, its final overall yield was high with grade figures close to Wilds (see Table 8).

*Hopi Acala and Tanguis were obtained through the courtesy of Mr. Arrowsmith, Raw Cotton Commission.

At the Gezira Research Farm, growth and plant development were poor, poorer in fact than at Nidiana. Tanguis, although showing its characteristic 'whiteness' and 'loofiness', showed symptoms of

Table 8.

American Types: Gezira Board, 1953-54.
Overall Means (3 sites).

Variety	*Area (acres)*	*Seed Cotton lb./acre*	*Lint lb./acre.*	*G.O.T.*	*Mean Grade*
BAR 7/8.1	30	1301	476	36·6	2·1
Wilds SUS 16/1	30	1407	462	32·9	1·7
Punjab 268F	15	1229	429	34·9	3·1
Hopi Acala†	19	870	272	31·3	2·5

blackarm, leafcurl and jassid attack (Abdel Magid). It was extremely late, a fact which would militate against its introduction into the general Gezira régime. BAR 7/8.1 again produced a miserable plant (although yields were fair) while BAR 11/3 gave poor yields of very inferior quality.

In fact, over the four sites 3 types only have emerged worthy of further consideration (i) Punjab 268F, (ii) Hopi Acala and (iii) BAR 11/7. With ample seed available of BAR 7/8.1, the two former will be bulked up in isolation at Wad en Nau (25 acres each) while BAR 11/7 will be multiplied at Kadugli. Such seed will be held in reserve against any future emergency.*

The peculiar behaviour of American types generally in the present season warrants further investigation. Work on 'salt tolerance' under controlled conditions has indicated that the American types are less tolerant of saltiness than the Egyptian types. It is possible that under certain conditions this factor may play an important part in the root-shoot relationship giving general unbalance to the plant.

Detailed characteristics of the 9 types under survey (with appropriate Egyptian controls) are given in Table 9.

Cotton Propagation (Mohammed Eff. Taha El Faki).

Large scale propagation and nucleus rogued areas grown throughout the Sudan are listed below:—

(a) Blue Nile Province: BAR 7/8.1 in Tozi area: 120 acres.
BAR 11/7, Wilds SUS 16/1 and Tanguis CNCP 46 and 47 at Abu Guta: 2, $1\frac{1}{2}$, $\frac{3}{4}$ and $\frac{3}{4}$ acres respectively.
Punjab 268F and Hopi Acala: 5 acres nucleus rogued area at each of the 3 sites Kab El Gidad, Nidiana, Hosh (Gezira).

(b) Kassala Province: BAR XL.1 2,990 acres.

†Much seed non-viable: hence depleted stands and poor yields.
*Since early 1952, the fear of a general trend towards the shorter staple cottons ($1'' - 1\frac{1}{16}''$) has become remote.

TABLE 9.

SURVEY OF AMERICAN (*G. hirsutum*) AND EGYPTIAN (*G. barbadense*) VARIETIES.
G.R.F. 1953-54, PLANTED 15.8.53.

Observation	*Sample*	*BAR 11/7*	*BAR 11/5*	*P268 F*	*Hopi Acala*	*BAR 7/8.2*	*Wilds 16/1*	*BAR 10/3*	*Tanguis 46*	*Tanguis 47*	X1730A	*Dom. Sakel*	*BLR 14/25*
Node Number (M)	30 plants	8·7	8·7	8·3	7·7	7·4	7·4	6·9	17·6	16·9	13·9	11·3	12·2
Plant Height (ins.)	20 plants	19·5	19·5	23·4	19·7	17·8	16·4	20·0	32·4	34·4	27·5	35·0	33·4
Hairiness (Leaf) L.		2	3	3	0	2	0	1	1	2	0	0	0
D.		2	1	3	0	3	0	2	5	5	0	0	0
Scale 1-5 with increasing Length and Density	Visual Assessment												
Av. Days to 1st square	30 plants	40	40	38	41	37	39	39	64	63	44	44	43
Av. Days to 1st flower: Approx. 50% of sample	60 plants	56	57	56	57	54	56	57	92	92	79	69	69
No. Fruiting Points: Days from sowing 40	10 plants	2	2	2	1	3	2	2	—	—	—	—	—
70		15	15	23	15	17	19	22	2	2	7	11	10
80		22	22	32	24	23	30	30	6	7	20	17	21
90		—	—	—	36	—	—	—	20	23	36	29	32
110		—	—	—	—	—	—	—	26	28	38	30	32
140		—	—	—	—	—	—	—	31	32	—	—	—
Maturation Period (boll)	25 bolls	55	57	53	52	59	59	56	73	75	73	65	62
No. of locules 3 loc.	60 bolls	5%	9%	—	2%	4%	7%	2%	100%	100%	97%	95%	100%
4 loc.		86%	71%	50%	84%	80%	90%	82%	—	—	3%	5%	—
5 loc.		9%	20%	50%	14%	16%	3%	16%	—	—	—	—	—
Seed Characters: Seed coat nep. (roller gin)	600 seeds	22%	35%	40%	40%	59%	17%	49%	—	—	—	—	—
Boll. Wt. (gms.)	60 bolls	3·52	3·82	4·90	4·51	4·20	5·43	4·95	3·60	3·55	2·8	2·8	2·5
Seed number/loc.	60 bolls	6·6	7·1	7·1	6·3	6·6	7·0	7·2	7·0	7·0	5·9	5·8	5·6
Seed Weight (gms.)	600 seeds	8·9	8·9	9·6	11·3	9·6	13·0	10·0	10·2	10·2	10·4	11·0	11·0
Lint Index (gms.)	600 seeds	4·3	4·6	5·3	6·0	5·7	6·8	6·5	6·9	6·8	5·3	5·2	4·9
G.O.T.	60 bolls	33%	33·5%	35·5%	34·0%	36·5%	34·5%	39%	39·5%	38·9%	33·1%	32·0%	31·2%
Lint Length mms.	30 seeds												
(1) Mean Max.		37·5	35·8	31·3	33·1	34·7	46·3	37·6	45·0	45·4	46·9	46·1	46·5
(2) Butterfly		32·0	30·4	26·7	27·3	29·0	39·3	31·2	39·5	39·0	40·8	41·2	40·8

	BLR 14/25.2: 210 acres with central nucleus rogued area of 5 acres.
	BAR XL.1(R): 160 acres with 5 acres nucleus area.
(c) Tokar:	XAT, 68 acres, for general propagation.
	XAT.1, 12 acres, for general propagation.
(d) Northern Province:	Wilds SUS 16/1 at Fadlab: 280 acres for bulk propagation, with nucleus rogued area of 10 acres.
(e) Kordofan:	BAR 7/8.1 at Semeiha: 3,284 acres with nucleus rogued area of 240 acres.
(f) Equatoria Province:	BAR 11/5 at Yambio: 75 acres for type maintenance.

PUBLICATIONS.

'A New Approach to the Technique of Cotton Selection'. Knight, R. L. and Rose, M. F. *Empire Cotton Growing Review.* July 1954.

SHAMBAT STATION.

BY

R. L. KNIGHT, S. O. S. DARK AND J. H. SAUNDERS.

METEOROLOGY.

Rain commenced half-way through July and continued until the end of September. The total rainfall for the season was 6·4 inches.

An exceptionally cold winter retarded the germination of out-of-season plots and rendered them largely ineffective.

The monthly mean maximum ranged from 107·8° F. in May 1953 to 85·1° F. in December 1953, with a mean maximum of 97·7° F. for the year.

GENETICS.

Production of 'Egyptian' Varieties Resistant to Blackarm and Leafcurl.

Domains Sakel Derivatives.—BLR 14/25.3 (B_2B_3 + leafcurl resistance).—Roguing for leafcurl was carried out on the 1½ acre plot sown in March 1953 (see last season's Report, p. 11) and 3,213 (42%) infected plants were removed leaving 4,404 healthy plants. Seed from the healthy plants was used to sow a propagation area of approximately seven acres in October 1953, and seed from this plot will go to the Gash for further propagation next season.

Other Blackarm Resistance Transferences to Sakel and X1730.—In the transference of the *arboreum* intensifying gene, B_{6m}, to BAR 4/16 selfed seed was produced from which F_3 lines homozygous for B_2, B_3 and B_{6m} can be grown next season. The BAR 5/6 transference is one generation behind this.

Small propagation plots of Sakel and X1730 types homozygous for B_2 and B_{6m} were grown during 1953-54 winter, but the transference of B_{6m} to BLR 14/25 was held up owing to the loss of this line in the breeding plot. This will necessitate going back to an earlier generation of seed.

Gene homology tests on Sakel carrying blackarm resistance transferred from *G. herbaceum* are not yet complete but it appears probable that *herbaceum* carries a gene not previously encountered.

A recessive blackarm resistance gene from *G. anomalum* was given the symbol b_8 and shown to be closely linked with the R_2 locus with a crossover value of about 1·4%.

In checking the homology of transferred Asiatic genes (1950-51 Report, p. 82) the F_2 of two B_4B_4 Sakels was grown. These two B_1 Sakels originated from two separate auto-allotetraploid transferences and the F_2 results proved that in both cases the transferred gene, B_4, went to the same locus in the AD genom.

Production of Blackarm Resistant Strains of American Upland.

Transferences involving B_{6m}.—The transference of the *arboreum* blackarm resistance intensifying gene, B_{6m}, from synthesized Sakels to Uganda BP52 derivatives and to BAR 11/7, BAR 7/8.1, BAR NT96.1, BAR 10/3, BAR 20/1 and Wilds SUS 16/1 was continued (see last season's Report, pp. 12-13). In the case of Wilds SUS 16/1 and of BP52 derivatives not carrying B_2, viz. C(51)22-6, C(51)17-1 and C(51)17-4, the genes B_2 and B_{6m} are being transferred together.

BAR 7/8.2.—The two acre propagation plot of BAR 7/8.2 sown in March 1953 (1952-3 Report, p. 13) yielded seed for the variety trials in the rainlands and also for sowing some 16 acres from September 1953 onwards. Within this second increase area a search was made for plants free from seed coat nep, utilizing the findings of Evenson at Namulonge, and 21 nep-free plants were found. Natural seed of these 21 plants was bulked and sown in about $\frac{1}{2}$ acre in February 1954. This area will be rogued down, by culling all plants with nep, and then expanded as BAR 7/8.3.

Wilds SUS 16/1.—Seed was produced from which a strain homozygous for B_2 can be obtained next season.

Jassid Resistance.

In the transference of MU8b hairiness to blackarm resistant Sakel, fifth backcross F_3 lines were obtained with excellent hairiness, and some sixth backcross F_1 material was grown out-of-season, so that next season's plots will carry both F_1 and F_2 lines of sixth backcross type.

The transference of the Ferguson hairiness complex is ahead of the MU8b work. A homozygous bulk was selfed out from the seventh backcross and given the number BLJR 14/36. This type shows

adequate hairiness for good jassid resistance, and in addition is homozygous for B_2 with or without B_3. It also shows some leafcurl resistance. It is not known whether the lint of BLJR 14/36 is up to standard but it seems likely that the hair weight will be above that of Sakel. Further backcrosses have been made in order to render this material homozygous for B_3 as well as for B_2 and to improve the lint quality.

The basic hairiness gene transferred from tetraploid *arboreum* (Multani) to Sakel was shown to be H_1.

Work on the transference of jassid resistance to Wilds SUS 16/1 was continued, using as recurrent parent in this generation material carrying B_2 with a view to producing a substrain of Wilds carrying resistance to both jassid and blackarm.

The association between H_2 and a reduction in staple length, noted by Simpson (1947) in T611 hybrids and by Patel and Thakar (1950) in *tomentosum* crosses, has been shown to be due to linkage and not to pleiotropy. Lines of blackarm resistant H_2 Sakel are now available with full staple length and these may prove of value for adding length of lint to shorter stapled types by the process of carrying H_2 through a few backcrosses and selfing out. It is unfortunate that H_2 reduces plant height and presumably reduces yielding capacity. A similar, though lesser, effect is noted with H_1 transferences to Sakel: the H_1 lines are slightly reduced in height and tend to be lower yielding than the Sakel controls.

BLJR 14/29 (Sakel + H_1 + B_2 B_3) shows moderate leafcurl resistance and this variety has been heavily rogued for leafcurl this season in order to increase this resistance. BLJR 14/29 is not a commercial type, but is being used as backcross parent in hairiness transferences. Even though this variety has proved lower yielding than BLR 14/25, it has been necessary to use it as recurrent parent for a limited number of generations in order to 'wean' the Ferguson minor hairiness gene complex from H_1^k (which is unbreakably linked with a factor for chlorophyll deficiency) and use it in association with normal H_1.

Work with *G. mustelinum,* St. Ignatius (*marie-galante*) and Hairy Giza 36 is being discontinued since it is clear that these types will not provide any new major hairiness genes.

Yield.

The transference of 4- and 5-loculed bolls from Ferguson, Stoneville 20, Clevewilt 7, Punjab 268F and 244F, and Pubescent T611 to BLR 14/25 is proceeding. The Ferguson transference reached the seventh backcross and from this material it is hoped to start selfing out 4-loculed lines next season.

Transference of increased ovule number per locule from *G. auritum* to BLR 14/25 has continued. The evidence from this work to date strongly suggests that the character is polygenic and that no major gene is involved. Selections for high ovule number were made in backcross F_2s and these were again backcrossed to BLR 14/25 and selfed.

Exploitation of Wild Gossypium Species.

G. thurberi.—Work on the transference of high lint strength to 'Sakel' was continued, using BLJR 14/29 as backcross parent.

G. anomalum.—106 plants were obtained from backcrossing the pentaploid plants mentioned in last season's Report (p. 15) with BLR 14/25.1. In backcrossing to BLR 14/25.3 forty-one of these plants proved female fertile. Plant appearance varied greatly, but many of the plants possessed leaf-hairiness comparable with that of *anomalum* and only four of the forty-one fertile plants were glabrescent. The majority of the progeny inherited the toughness characteristic of *anomalum* leaves. The narrow bract of *anomalum* which was one of the characters sought in this cross did not appear.

Detailed records were made on all of the 106 plants, including their floral morphology. Nearly all the plants were unstable in some floral character.

Other Species.—The seed of 8 crosses between wild species and New World cottons (1952-53 Report, p. 15) was treated with colchicine solution but no hexaploid plants were obtained.

Pentaploid families have been grown from the crosses of 5 American hexaploids with BLR 14/25.2. The crosses with *G. harknutum* and *G. herbasutum* failed to produce families.

This season we have concentrated on obtaining self-bred seed, as seed stocks of many forms had become dangerously depleted.

Bollworm Resistance.

In the transference of resistance to pink and Egyptian bollworm from *G. thurberi* to BAR 11/7, segregates differing markedly from the controls in bollworm infestation were obtained in material of [(*G. 'thurbadense'* × *Sakel*) × XA 129^2] × BAR 11/7 F_1 composition. In general appearance the plants were very similar to BAR 11/7, itself a derivative of XA 129. Controls of BAR 11/7 were scattered in the plot and all open bolls in both families and controls were examined for bollworm damage, but no attempt was made to classify the material into damage by pink, Egyptian, American or Sudan bollworm. In the figures tabulated overleaf, the four best selections are compared with the control.

	Healthy locs.	*Partly diseased locs.*	*Fully diseased locs.*
BAR 11/7 (av. of 200 plants)	10·4	53·4	135·0
PE18/53.128	134	106	80
PE18/53.134	171	121	73
PE18/53.136	109	28	19
PE20/53. 23	138	63	51

The two control plants with least bollworm damage and the two with most bollworm damage gave respectively:

		Healthy locs.	*Partly diseased locs.*	*Fully diseased locs.*
BAR 11/7	Two best plants	39	79	145
		12	38	50
	Two worst plants	0	41	186
		7	95	269

Fifteen plants showing the least bollworm infestation were chosen for further backcrossing to BAR 11/7 and for selfing.

In the transference of resistance to BLR 14/25, much more variable results were obtained and it seemed probable that whereas in the BAR 11/7 crosses the portion of *thurberi* chromosome concerned with resistance had crossed in to the genom, in the BLR 14/25 crosses this had not yet occurred. It seems that in backcrossing D/AD hexaploids to New World (AD) cottons, it is important to change from *barbadense* to *hirsutum* (or vice versa) for one or more crosses early in the hybridization programme, to facilitate the 'crossing-in' of the New World wild D genom (Knight, 1954).

In transferences involving *armourianum* via the hexaploid *G. 'armadense'*, considerable sterility was still encountered but a number of plants which appeared to carry bollworm resistance were selected for further backcrossing to BLR 14/25.3.

Earliness.

Work on the transference of earliness from *G. arboreum* and *G. herbaceum* to BLR 14/25 was continued.

Hormone Treatment.

Plants of a triploid family at Shambat and Medani were used to determine the optimum concentration and number of applications of hormone solution required to prevent shedding of the bolls (1952-53 Report, p. 16). Concentrations of 2,000, 1,000 and 500 ppm. with 1, 2, 3 and continued applications at weekly and fortnightly (Medani) intervals were tested. At Shambat, 1,000 ppm. solution gave the best

results with 1, 2 or 3 applications equally effective, resulting in approximately 25% bolls from the treated flowers. At Medani all the treatments were equally effective and bolls matured from 80-100% of the treated flowers.

Type Collection.

Uplands from U.S.A., Central America, South America, Russia and Asia were grown at Medani and surveyed comprehensively, emphasis being placed on economic characters. Certain lines with glabrous leaves appeared to show some jassid resistance and this observation will be checked next season in a small replicated experiment.

The cataloguing of the Type Collection is being reorganised and the revised lists will be available by the end of 1954.

Diseases and Pests.

Shambat again suffered an outstandingly heavy attack of pink and Egyptian bollworm. Towards the end of the season a technique of putting white paper bags over the flower buds, for self or cross-bred bolls, was used with marked success, bollworm damage being greatly reduced. This technique was started by Mr. Saunders, who had used it with success in Nigeria.

References.

Knight, R. L. (1954). Cotton Breeding in the Sudan. *Emp. J. Exp. Agric.* (in press).

Patel, G. B. & Thakar, B. J. (1950). Cotton Improvement through Interspecific Hybridization. *Indian Cott. Gr. Rev.*, 4, 185-198.

Simpson, D. M. (1947). Fuzzy Leaf in Cotton and its association with Short Lint. *J. Hered.*, 38, 153-156.

KADUGLI STATION.

BY

M. F. ROSE AND A. LOW.

General.

At Kadugli, rains were well above average with fair distribution. Rainfall figures for the Kordofan cotton area are shown in Table 10 with temperatures for Kadugli appended.

Table 10.

Rainfall mms.

Station	Month								
	April	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Total*
Kadugli (Feb. 0·2 mms.)	30·5	131·8	164·4	184·5	214·0	211·2	73·0	2·5	1012·1
Dilling	17·0	35·0	96·0	104·5	222·0	158·5	—	—	633·0
Lagowa	20·0	91·0	161·0	243·5	218·5	133·5	14·0	—	881·5
Talodi	38·5	78·0	161·5	284·0	218·0	110·0	93·0	9·5	992·5
Kalogi	5·0	35·0	93·0	237·0	198·0	157·0	98·0	6·0	829·0
Um Berembeita	—	45·5	107·0	166·0	174·5	129·5	49·5	13·0	685·0
Abu Gubeiha	—	45·5	118·5	145·0	247·0	82·5	146·5	11·0	796·0
Abbassiya	—	25·0	107·0	133·0	186·0	86·0	56·0	—	593·0

Temperatures °F. (Kadugli).

	Mean max.	*Range*	*Mean min.*	*Range*
Period Resting: Dec. 1952—May 1953	100	106-91	68	79-62
Period Growth: June 1953—Nov. 1953	91	98-82	68	73-62

Heavy rains started early in July around the optimum sowing date, causing severe waterlogging in low-lying areas. Here germination and growth were poor, necessitating much re-sowing. In consequence much of the crop was sown as late as August, with the inevitable sequel of poor yields. By contrast the crop on the higher land got away to a good start and very good yields were returned.

Damage by pests and diseases was generally slight and the commercial crop averaged 406 lb. of seed cotton over an estimated 162,966 acres.

Cotton Variety Trials.

The standard variety trials were planted at Lagowa, Kadugli, Talodi and Habeila on 4th, 5th, 7th and 9th July respectively. The layout was identical, 5 varieties repeated 7 times in randomized blocks. Plot size was 0·025 acres with spacing 90 cms. × 90 cms.

Yield figures are given in Table 11.

For the second season in succession, BAR 7/8.1 maintained its high standard of yield. At all four sites it outyielded significantly BAR SP84 and overall lint figures indicated an increase over BAR SP84 and Pump Scheme Strain of 42% and 29% respectively. In every case it was superior in lint yield to BAR 7/8.2 but not significantly so.

Combined yield and spinning test figures for the two seasons are worthy of note:

BAR SP84 v. BAR 7/8.1.

	Lint lb./acre	%
BAR 7/8.1	261	137
BAR SP84	191	100

Mean of 4 trials (8 replications) 1952-53 and 4 trials (7 replications) 1953-54.

TABLE 11.

KORDOFAN VARIETY TRIALS, 1953-54.

YIELD OF SEED COTTON AND LINT IN LB. PER ACRE.

	Habeila			*Talodi*			*Lagowa*			*Kadugli*			*Overall Mean*		
	Seed Cotton	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O.T.*	*Seed Cotton*	*Lint*	*G.O.T.*
BAR 7/8.1	533	176	33·0	683	228	33·4	412	134	32·5	1155	375	32·5	696	228	32·8
BAR 7/8.2	489	162	33·2	612	206	33·7	405	131	32·3	1090	352	32·3	649	213	32·9
BAR 7/3	574	177	30·9	518	161	31·1	379	115	30·3	942	286	30·4	603	185	30·7
BAR SP84	451	134	29·7	519	152	29·4	356	102	28·6	882	254	28·8	552	160	29·1
Pump Scheme	532	156	29·4	586	168	28·6	339	97	28·5	1008	284	28·1	616	176	28·7
S.E. (mean)		11·3			13·0			6·5			20·8				
Difference P = 0·05		33			38			19			61				

TABLE 14.

SUMMARY OF SPINNING TEST REPORTS ON CURRENT NUBA MOUNTAINS STRAINS UP TO AND INCLUDING 1952-53.

Variety	*Effective Length 32's*			*Standard Hair Weight*			*Corrected Lea-Count × Strength Product*								
		Mean			*Mean*		*Means of 32's*			*Means of 40's*			*Means of 50's*		
	No. of Trials	*Variety*	*BAR SP84*	*No. of Trials*	*Variety*	*BAR SP84*	*No. of Trials*	*Variety*	*BAR SP84*	*No. of Trials*	*Variety*	*BAR SP84*	*No. of Trials*	*Variety*	*BAR SP84*
PSS	21	37	38	21	194	195	—	—	—	21	2210	2154	11	2040	1968
BAR 7/3	9	36	37	9	206	193	1	2179	2023	9	2010	2072	1	2020	2147
BAR 7/8	10	36	37	10	195	194	1	1937	2023	10	2051	2184	1	2016	2142
BAR 7/8.1	4	37	37	4	197	200	—	—	—	4	2043	2139	—	—	—

	Effective Length (32 nds)	*Standard Hair Weight*	*C×S(40's)*	*Yarn Appearance*
BAR 7/8.1	37	197	2043	5·2
BAR SP84	37	200	2139	5·0

Mean of 4 trials 1952-53.

Variety trial figures (Table 12) from Tozi and Yambio indicate its adaptability both to the dryer conditions of the Central Rainlands and to the wetter clime of Equatoria.

TABLE 12.*

Tozi V. T. 1953-54. 6×6 Latin Square (adjusted to stand by co-variance).		Yambio V. T. 1953-54. Randomized Block (6 replics.).		
	Lint (lb./acre)		*Lint (lb./acre)*	*G.O.T.*
BAR 7/8.1	481	BAR 7/8.1	317	37·9
BAR 7/8.2	466	BAR SP84	248	34·8
P 268F	460	BAR 11/5	227	34·4
MU8b	415	S47	225	33·9
BAR SP84	348			
PSS	326			

Diff. (Maximum) 5% level. =51 lb. S.E. (mean) =11. Sign. difference 5% level = 33 lb.

A summary of performance of current strains in Kordofan variety trials (up to and including season 1953-54), and spinning test figures (to 1952-53) are shown in Tables 13 (below) and 14 (p. 19).

TABLE 13.

SUMMARY OF PERFORMANCE OF CURRENT STRAINS IN KORDOFAN VARIETY TRIALS UP TO AND INCLUDING SEASON 1953-54.

Variety	*Seed Cotton (lb./acre)*				*Lint (lb./acre)*			
	No. of Trials	*Variety*	*PSS*	*Variety as % of PSS*	*No. of Trials*	*Variety*	*PSS*	*Variety as % of PSS*
PSS	67	930	930	100	58	268	268	100
BAR SP84	24	871	894	97	24	279	268	104

	Seed Cotton (lb./acre)				*Lint (lb./acre)*			
	No. of Trials	*Variety*	*BAR SP84*	*Variety as % of BAR SP84*	*No. of Trials*	*Variety*	*BAR SP84*	*Variety as % of BAR SP84*
BAR SP84	28	984	984	100	28	314	314	100
BAR 7/3	12	882	885	100	12	284	272	104
BAR 7/8.1	8	775	641	121	8	261	191	137
BAR 7/8.2	4	649	552	118	4	213	160	133
PSS	24	894	871	103	24	269	279	96

*Plot data kindly supplied by Senior Research Officers, Yambio and Tozi to whom acknowledgment is made.

COTTON PROPAGATION.

At Semeiha (on the Abu Habl Scheme) 3,284 acres of BAR 7/8.1 (under flood irrigation) averaged 655 lb. of seed cotton per acre. Seed from this area will constitute a new commercial 'wave' to plant 29,064 acres in the Kalogi-Subu area in the 1954-55 season.

Appendix.

Key to Symbols Used in this Report.

Egyptian S. types.

DS	Domains Sakel originally imported from Egypt.
BLR 14/16	BAR 14/7 (B_2) re-selected for leafcurl.
BLR 14/16.1	1st filter.
BLR 14/25	A Sakel type carrying B_2 and B_3 with fair leafcurl resistance.
BLR 14/25.1	1st filter.
BLR 14/25.2	2nd filter.
BLR 14/25.3	3rd filter (for increased leafcurl resistance).
BLJR 14/23	A leafcurl resistant Sakel, blackarm resistant (B_2) and homozygous for H_1 (hairiness).
BLJR 14/29	A leafcurl resistant Sakel, homozygous for B_2, B_3, H_1.
BLJR 14/36	A leafcurl resistant Sakel, homozygous for B_2, B_3, H_1 and carrying the Ferguson hairiness complex
Hairy Giza 36	Hairy *barbadense* type: direct import from Egypt.

Egyptian L. types.

X1730A or XA	Successor type to X1730.
XAG	X1730A. Gash grown.
XAT	X1730A. Tokar Grown.
XAT.1	1st filter of XAT.
BAR 1730L or BAR XL or XL	7th backcross X1730A, homozygous for B_2.
BAR 1730L.1 or BAR XL.1 or XL.1	1st filter of BAR 1730L.
BAR 1730L.3 or BAR XL.3 or XL.3	3rd filter of BAR 1730L.
BAR 4/16	An X1730A type carrying both B_2 and B_3.
BAR 4/16.1	1st filter.
BAR 5/6	An X1730A type carrying B_2, B_3 and the red *arboreum* pigment gene R_2^{RS}

American Upland.

B31	A blackarm resistant Upland type from Uganda.
BAR SP84	The blackarm resistant component of Uganda SP84.
BAR SP84.1 and 2	1st and 2nd filters.
BAR 7/3	A selection from BAR SP84 for improved G.O.T.
BAR 7/8	BAR SP84 carrying B_2 and B_3.
BAR 7/8.1 and 2	1st and 2nd filters.
BAR NT96	A single plant selection from the cross '57 × Over-the-Top' (carrying B_2).
BAR NT96.1	1st filter.
BAR 20/1	BAR NT96 'cluster' type carrying B_2.
BAR 12/3	5th backcross BP52, homozygous for B_2.
BAR 12/9	From C(48)4 Namulonge BP52 stock made homozygous for B_2.
BAR 12/9.1, 2 and 3	1st, 2nd and 3rd filters of BAR 12/9 for increased blackarm resistance.
Pump Scheme Strain (PSS)	An old commercial bulk deriving from Nyasaland Upland.
XA129	A single plant selection from PSS.
BAR 11/5	XA129 homozygous for B_2.
BAR 11/6	XA129 homozygous for B_3.
BAR 11/7	XA129 homozygous for B_2 and B_3.
BAR 10/1 and BAR 10/3	Deltapine types carrying B_2.
MU8b	A Malwa Upland type (from India).
Wilds SUS 16/1	American long staple type: Irrigated.
BAR 13/1	511D carrying B_2 and B_3.
S47	A direct importation from Uganda.
Stoneville 20	A direct importation from Belgian Congo.

Ferguson	A hairy American type from the Philippines (via Trinidad).
St. Ignatius	A hairy *marie-galante* type.
Kapas Purao	A densely hairy cotton from the Philippines via Trinidad (UA 7-47).
Punjab 268F	A hairy, salt-tolerant type directly imported from India, 1952-1953.
Hopi Acala	A very early type directly imported from U.S.A., 1953: of high intrinsic fibre strength.

Genes.

B_1	A weak dominant blackarm resistance factor from Uganda B31.
B_2	A strong dominant blackarm resistance factor from Uganda B31.
B_3	A partially dominant blackarm resistance factor from *G. punctatum*.
B_4	A partially dominant blackarm resistance factor from *G. arboreum*.
B_5	A partially dominant blackarm resistance gene from 'Grenadines White Pollen'.
B_{6m}	A blackarm resistance intensifier from *G. arboreum*.
B_7	A partially dominant blackarm resistance gene from Stoneville 20.
b_8	A recessive blackarm resistant gene from *G. anomalum*.
H_1	A hairiness gene from Tanguis.
H_2	A hairiness gene from *G. tomentosum*.

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